

WHAT IS CLAIMED IS:

1. An ink jet printing apparatus for forming an image by ejecting ink from a print head onto a print medium, wherein the print head has arrayed in nozzle columns at least two kinds of nozzles that eject different volumes of ink supplied from a common ink chamber, the ink jet printing apparatus comprising:

a preliminary ejection means for performing ink ejections, not involved in the formation of an image, from the nozzles of the print head;

a suction means for sucking out ink from the print head through the nozzles of the print head; and

a control means for causing the suction means to suck out ink from the print head and then the preliminary ejection means to perform the ink ejections;

wherein, in the ink ejection operation by the preliminary ejection means following the sucking-out of ink by the suction means, the control means causes the nozzles of the same kind to eject ink simultaneously and controls to set the number of ejections from the nozzles with a large ink ejection volume larger than the number of ejections from the nozzles with a small ink ejection volume.

2. An ink jet printing apparatus for forming an

image by ejecting ink from a print head onto a print medium, wherein the print head has arrayed in nozzle columns at least two kinds of nozzles that eject different volumes of ink supplied from a common ink chamber, the ink jet printing apparatus comprising:

a preliminary ejection means for performing ink ejections, not involved in the formation of an image, from the nozzles of the print head;

a suction means for sucking out ink from the print head through the nozzles of the print head; and

a control means for causing the suction means to suck out ink from the print head and then the preliminary ejection means to perform the ink ejections;

wherein, in the ink ejection operation by the preliminary ejection means following the sucking-out of ink by the suction means, the control means causes the nozzles of the same kind to eject ink simultaneously and controls to set a frequency at which to eject ink from the nozzles with a small ink ejection volume lower than a frequency at which to eject ink from the nozzles with a large ink ejection volume.

3. An ink jet printing apparatus according to claim 1, wherein the preliminary ejection means executes the ejection operation of the nozzles with a

large ink ejection volume before the ejection operation of the nozzles with a small ink ejection volume.

5        4. An ink jet printing apparatus according to claim 1, wherein the preliminary ejection means sets an ejection frequency of the nozzles with a small ink ejection volume lower than an ejection frequency of the nozzles with a large ink ejection volume.

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5. An ink jet printing apparatus according to claim 1, wherein the print head has different nozzle columns for different ink colors, and the preliminary ejection means causes the same kind of nozzles in the  
15 nozzle columns of each ink color to perform an ejection operation at a time.

6. An ink jet printing apparatus according to claim 1, wherein the print head is scanned in a  
20 direction different from a direction in which the nozzles are arrayed and, during this scan operation, ejects ink onto a print medium, the print medium is fed a predetermined distance in a direction different from the scan direction of the print head in a motion  
25 relative to the print head, and the print head scan and the print medium feed are alternately performed repetitively to form an image on an entire surface of

the print medium;

wherein the at least two kinds of nozzles that eject different volumes of ink supplied from the common ink chamber are arranged alternately in a direction different from the scan direction of the print head to form nozzle columns, and the nozzles in the nozzle columns with a large ink ejection volume are made to execute an ejection operation in advance of the nozzles with a small ink ejection volume.

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7. An ink jet printing apparatus according to claim 1, wherein the number of preliminary ejections from the nozzles with a small ink ejection volume is defined as a required number of preliminary ejections for discharging ink from nozzles paths with a small ink ejection volume.

8. An ink jet printing apparatus according to claim 1, wherein the nozzles each generate a bubble in ink by thermal energy to eject ink as a droplet with a pressure of the inflating bubble.

9. A preliminary ink ejection method using an ink jet printing apparatus, wherein the ink jet printing apparatus forms an image by ejecting ink from a print head onto a print medium, wherein the print head has arrayed in nozzle columns at least two kinds of

nozzles that eject different volumes of ink supplied from a common ink chamber, the preliminary ink ejection method comprising:

5 a preliminary ejection step of performing ink ejections, not involved in the formation of an image, from the nozzles of the print head;

a suction step of sucking out ink from the print head through the nozzles of the print head; and

10 a control step of causing the suction step to suck out ink from the print head and then the preliminary ejection step to perform the ink ejections;

wherein, in the ink ejection operation by the preliminary ejection step following the sucking-out of ink by the suction step, the control step causes the  
15 nozzles of the same kind to eject ink simultaneously and controls to set the number of ejections from the nozzles with a large ink ejection volume larger than the number of ejections from the nozzles with a small ink ejection volume.

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10. A preliminary ink ejection method using an ink jet printing apparatus, wherein the ink jet printing apparatus forms an image by ejecting ink from a print head onto a print medium, wherein the print head has  
25 arrayed in nozzle columns at least two kinds of nozzles that eject different volumes of ink supplied from a common ink chamber, the preliminary ink

ejection method comprising:

a preliminary ejection step of performing ink ejections, not involved in the formation of an image, from the nozzles of the print head;

5 a suction step of sucking out ink from the print head through the nozzles of the print head; and

a control step of causing the suction step to suck out ink from the print head and then the preliminary ejection step to perform the ink ejections;

10 wherein, in the ink ejection operation by the preliminary ejection step following the sucking-out of ink by the suction step, the control step causes the nozzles of the same kind to eject ink simultaneously and controls to set a frequency at which to eject ink  
15 from the nozzles with a small ink ejection volume lower than a frequency at which to eject ink from the nozzles with a large ink ejection volume.

11. A preliminary ink ejection method according to  
20 claim 9, wherein the preliminary ejection step executes the ejection operation of the nozzles with a large ink ejection volume before the ejection operation of the nozzles with a small ink ejection volume.

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12. A preliminary ink ejection method according to claim 9, wherein the preliminary ejection step sets an

ejection frequency of the nozzles with a small ink ejection volume lower than an ejection frequency of the nozzles with a large ink ejection volume.

5        13. A preliminary ink ejection method according to claim 9, wherein the print head has different nozzle columns for different ink colors, and the preliminary ejection step causes the same kind of nozzles in the nozzle columns of each ink color to perform an  
10        ejection operation at a time.

14. A preliminary ink ejection method according to claim 9 using an ink jet printing apparatus, wherein the print head is scanned in a direction different  
15        from a direction in which the nozzles are arrayed and, during this scan operation, ejects ink onto a print medium, the print medium is fed a predetermined distance in a direction different from the scan direction of the print head in a motion relative to  
20        the print head, and the print head scan and the print medium feed are alternately performed repetitively to form an image on an entire surface of the print medium;

wherein the at least two kinds of nozzles that  
25        eject different volumes of ink supplied from the common ink chamber are arranged alternately in a direction different from the scan direction of the

print head to form nozzle columns, and the nozzles in the nozzle columns with a large ink ejection volume are made to execute an ejection operation in advance of the nozzles with a small ink ejection volume.

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15. A preliminary ink ejection method according to claim 9, wherein the number of preliminary ejections from the nozzles with a small ink ejection volume is defined as a required number of preliminary ejections  
10 for discharging ink from nozzles paths with a small ink ejection volume.